

What is claimed is:

- 5 1. A modified known nucleic acid of a parasite which is capable of being expressed in a mammalian cell wherein the modification comprises a reduction of AT content of the gene by replacing one or more AT containing codons in the gene with a preferred codon encoding the same amino acid as the replaced codon.
- 10 2. A modified known nucleic acid of a parasite protein which is capable of being expressed in a mammalian cell wherein at least one mRNA instability motifs present in the gene coding sequence is eliminated by replacing said mRNA instability motif with a preferred codon encoding the same amino acid as the replaced codon.
- 15 3. The modified nucleic acid of claim 1 or 2 wherein at least one or more codons of the known gene is replaced by a preferred milk protein specific codon encoding the same amino acid as the replaced codon.
- 20 4. A modified known nucleic acid of a parasite which is capable of being expressed in a mammalian cell, wherein the overall AT content of the known gene encoding is lowered by replacement with a milk protein specific codon, and wherein at least one mRNA instability motif present in the gene is eliminated by replacement with a milk protein specific codon and at least one codon of the natural gene is replaced by a preferred milk protein specific codon.
- 25 5. The modified nucleic acid of claim 4 wherein said modified nucleic acid is capable of expressing said protein at a level which is at least 100% of that expressed by said natural gene in an *in vitro* or *in vivo* mammalian cell system.

6. A method for preparing a modified known nucleic acid of a parasite for expression in a mammalian cell comprising lowering the AT content of the natural gene by replacing one or more AT containing codons of the natural gene with a preferred mammary specific codon encoding the same amino acid as the replaced codon.

7. A method for preparing a modified known nucleic acid of a parasite protein for expression in a mammalian cell comprising eliminating at least one mRNA instability motif present in the gene coding sequence by replacing one or more mRNA instability motif in the gene with a mammary specific codon encoding the same amino acid as the replaced codon.

8. The method of claim 5 or 6 further comprising replacing one or more codons in the natural gene encoding said protein with a preferred mammary specific codon encoding the same amino acid as the replaced codon.

9. A modified nucleic acid sequence prepared by the method according to claim 5 or 6.

10. A method for preparing a modified known nucleic acid of a parasite for expression in a mammalian cell comprising the steps of:

a) eliminating at least one mRNA instability motif present in the natural gene encoding said protein by replacing one or more mRNA instability motifs in the gene with a preferred milk protein specific codon encoding the same amino acid as the replaced codon;

b) lowering the AT rich content of the natural gene encoding said protein by replacing one or more AT containing codons of the gene with a milk protein specific

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codon encoding the same amino acid as the replaced codon; and

c) replacing one or more codons in the natural gene encoding said protein with a preferred mammary specific codon encoding the same amino acid as the replaced
5 codon.

11. A modified nucleic acid prepared by the method according to claim 10.

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10 12. A modified nucleic acid of claim 1 wherein said parasite is malaria and said nucleic acid is a fragment of SEQ ID NO 1 or SEQ ID NO 9 or a sequence specifically homologous thereto.

13. 12. A modified nucleic acid of claim 1 wherein said parasite is malaria and said nucleic acid is or SEQ ID NO 9 or a fragment thereof or a sequence specifically
15 homologous thereto.

14. A modified nucleic acid that is a fragment of SEQ ID NO 1 or a sequence specifically homologous thereto capable of being expressed in a cell system wherein the AT content of the natural gene is lowered by replacement of one or more codons
20 with codons recognizable by said cell culture system coding for the same amino acid as the replaced codon but which effectively lower the overall AT content of the natural gene.

15. A modified nucleic acid that is a fragment of SEQ ID NO 1 or a sequence specifically homologous thereto, capable of being expressed in a cell system wherein at least one mRNA instability motif present in the natural gene coding sequence is eliminated by replacing one or more codons comprising said instability motif with a codon recognizable by said cell system which effectively eliminates said instability motif and encodes the same amino acid as the replaced codon.
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16. The modified nucleic acid of claims 14 or 15 wherein at least one or all codons of the natural gene are replaced with preferred codons of said cell system.

17. A vector comprising the modified nucleic acid of claim 12.

18. A host cell transfected or transformed with a vector of claim 17.

19. A transgenic expression construct comprising the modified nucleic acid of claim 12.

20. A transgenic non-human animal whose germline comprises the modified nucleic acid of claim 12.

21. A transgenic expression vector for the production of a transgenic animal comprising a promoter, operatively associated with the modified nucleic acid of claim 12, wherein said promoter directs mammary gland expression of the protein encoded by said modified nucleic acid into the animal's milk.

22. A modified known nucleic acid of a bacterium, virus, or parasite which is capable of being expressed in a cell system wherein the AT content of the gene is lowered by replacement of one or more codons with codons recognizable by said cell system coding for the same amino acid as the replaced codon, but which effectively lower the overall AT rich content of the natural gene.

23. A modified nucleic acid of a bacterium, virus, or parasite which is capable of being expressed in a cell system wherein at least one mRNA instability motifs present in the gene coding sequence is eliminated by replacing one or more codons comprising said instability motif with a codon recognizable by said cell system which

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C7 effectively eliminates said instability motif and encodes the same amino acid as the replaced codon.

24. A modified nucleic acid of claims 22 or 23, wherein at least one or all codons
5 of the natural gene are replaced with preferred codons of said cell system.

25. A DNA vaccine comprising a modified nucleic acid according to claim 24.

26. A DNA vaccine comprising a vector according to claim 17.

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